

U.S. Serial No. 10/697,370
Amendment Dated September 15, 2005
Response To Office Action Dated April 20, 2005

REMARKS

The pending application was filed on October 30, 2003 with claims 1-20. The Examiner issued a Non-Final Office Action dated October 18, 2004 rejecting claims 1, 5-12, and 16-20 and objecting to claims 2-4 and 13-15 while indicating that the claims 2-4 and 13-15 would be allowable if rewritten in independent form including all of the claim limitations of the base claim and any intervening claims. A Response dated January 18, 2005 was filed in which claim amendments and arguments were presented. The Examiner issued a Final Office Action dated April 20, 2005 in which the Examiner objected to claims 2-4 and 13-15 and indicated that claims 2-4 and 13-15 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Examiner also rejected claims 1, 5-12 and 16-20. In particular, the Examiner rejected claims 1, 6-9, and 11 under 35 U.S.C. §102(e) as being anticipated, and therefore unpatentable, in view of United States Published Application No. 2004/0022630 to *Tiemann*, rejected claims 1 and 7-9 under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 5,511,309 to *Beabout*, and rejected claims 1, 6-7, and 9-10 under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 3,799,696 to *Redman*. The Examiner also rejected claims 5, 12, 16-18, and 20 under 35 U.S.C. §103(a) as being unpatentable over United States Published Application No. 2004/0022630 to *Tiemann* in view of United States Patent No. 5,120,192 to *Ohtomo* and rejected claim 19 under 35 U.S.C. §103(a) as being unpatentable over *Tiemann* and *Ohtomo*, as applied to claim 18, and further in view of *Redman*.

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The Undersigned Representative and the Examiner conducted a telephonic interview on July 20, 2005 in which an amendment was proposed to distinguish the instant invention from *Tiemann*. However, an agreement was not reached.

Claims 1-20 remain pending in the patent application. In view of the arguments set forth below, claims 1-20 are allowable, and the Examiner is respectfully requested to withdraw the rejections and issue a Notice of Allowance.

I. SPECIFICATION

The Examiner objected to the specification as failing to provide proper antecedent basis for the claimed subject matter. In particular, the Examiner stated that amended claim 1, line 7 states that the first turn is formed from a continuous wall. The Examiner stated that although such a configuration is shown in Figure 2, the specification does not include such language. The specification has been appropriately amended as set forth above to accurately describe the configuration shown in Figure 2. No new matter has been added. Therefore, the Examiner is respectfully requested to withdraw the rejection.

II. REJECTION OF CLAIMS 1, 6-9, AND 11 UNDER 35 U.S.C. §102(e)

The Examiner rejected claims 1, 6-9, and 11 under 35 U.S.C. §102(e) as being anticipated, and therefore unpatentable, in view of United States Published Application No. 2004/0022630 to *Tiemann*. The Examiner stated that *Tiemann* discloses a turbine vane

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having all of the claimed elements. The Examiner argued that the phrases "adapted to be coupled to a shroud assembly" and "adapted to be coupled to a manifold assembly" are recitations of intended use.

Tiemann discloses a gas turbine vane with an internal cooling system. As shown in Figure 1, of *Tiemann*, cooling fluids enter the internal cooling system in impingement cooling insert (37) and flow in the direction of arrow (61). As stated at in paragraph [0022]

When in use, the gas -turbine blade 1 is arranged in a gas turbine (not shown) and hot gas flows around it. The high thermal loading requires cooling by use of a cooling fluid 61, which is fed to the gas-turbine guide blade 1 via the inlet region 33 of the first section 23. Since the impingement-cooling insert 37 completely covers the inlet region 33, the cooling fluid 61 is first of all directed entirely into the impingement-cooling insert 37. From the impingement-cooling insert 37, the cooling fluid discharges via the impingement-cooling holes 43 perpendicularly to the wall of the airfoil region 7 and strikes the latter in a cooling manner. In particular, the airfoil leading edge 8 is thereby cooled very effectively through leading-edge impingement-cooling holes 45.

The cooling fluid 61 which has discharged from the impingement-cooling insert 37, after impingement cooling has been effected, is then directed via the air-guide ribs 51 in the direction of the free part of the first section 23, the free part being produced by the tapering of the impingement-cooling insert 37. . . . The cooling air directed into the free part of the first section 23 via the air-guide ribs 51 is directed into the second section 25 and then into the third section 27. (emphasis added).

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Tiemann discloses a cooling system in which cooling fluids enter the turbine vane, flow in a first direction, flow through impingement orifices positioned generally orthogonal to the first direction of cooling fluid flow and impinge on a wall forming a leading edge of the turbine airfoil. The cooling fluids are then redirected about 180 degrees and flow along air-guide ribs 51, and the cooling fluids are finally redirected about 60 degrees to flow into a channel of a serpentine cooling channel. The claimed invention does not have such a cooling configuration.

Claim 1 has been amended to state, in relevant part, "wherein the first inflow section of the serpentine cooling path forms a generally linear cooling fluid pathway between the at least one inlet orifice and the first turn of the serpentine cooling path" (emphasis added). In contrast, the cooling channel disclosed in *Tiemann* does not disclose a generally linear cooling fluid pathway extending between an inlet orifice and the first turn of the serpentine cooling path. Rather, as discussed above, the internal cooling system disclosed in *Tiemann* routes cooling fluids through impingement orifices and redirects the cooling fluids multiple times before exhausting the cooling fluids into the first section of a serpentine cooling channel. In particular, the system disclosed in *Tiemann* directs cooling fluids into the turbine vane in a first direction. The cooling fluids flow through impingement orifices positioned generally orthogonal to the first direction of cooling fluid flow and impinge on a wall forming a leading edge of the turbine airfoil. The cooling fluids are then redirected about 180 degrees and flow along air-guide ribs 51, and the cooling fluids are finally redirected

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about 60 degrees to flow into a channel of a serpentine cooling channel. Such a configuration creates a much different cooling scheme with differing cooling fluid temperatures and increased cooling fluid pressures. As a result, the cooling fluid flow scheme of *Tiemann* is less efficient than the claimed invention. Thus, for at least these reasons, independent claim 1 and dependent claims 6-9 and 11 are allowable, and the Examiner is respectfully requested to withdraw the rejection.

III. REJECTION OF CLAIMS 1 AND 7-9 UNDER 35 U.S.C. §102(b)

The Examiner rejected claims 1 and 7-9 under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 5,511,309 to *Beabout*. The Examiner stated that *Beabout* discloses a turbine vane having all of the claimed elements. The Examiner also argued that the phrases "adapted to be coupled to a shroud assembly" and "adapted to be coupled to a manifold assembly" are recitations of intended use.

Claim 1 is directed, in relevant part, to a turbine vane comprising "a generally elongated hollow airfoil . . . [and] at least one metering rib defining a barrier between a portion of the first inflow section and the at least one leading edge cooling path, wherein the at least one metering rib includes at least one metering orifice creating a fluid pathway between the first inflow section and the at least one leading edge cooling path" (emphasis added). In contrast, the airfoil cooling system disclosed in *Beabout* does not anticipate claim 1 or any claim dependent therefrom. Specifically, *Beabout* does not disclose a metering rib defining a barrier between the first inflow channel of the serpentine channel and the leading

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edge cooling path, where the metering rib includes at least one metering orifice creating a fluid pathway between the first inflow section and the at least one leading edge cooling path. Rather, *Beabout* simply discloses a rib separating a serpentine channel from leading edge channel. In particular, *Beabout* discloses a leading edge passage wall 98 with a plurality of crossover holes 96 that form a pathway between a leading edge passage 90 and two leading edge exhaust passages 100, as shown in Figure 3. Thus, the configuration disclosed in *Beabout* does not anticipate amended claim 1. Therefore, claims 1 and 7-9 are allowable, and the Examiner is respectfully requested to withdraw the rejection.

IV. REJECTION OF CLAIMS 1, 6-7, AND 9-10 UNDER 35 U.S.C. §102(b)

The Examiner rejected claims 1, 6-7, and 9-10 under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 3,799,696 to *Redman*. The Examiner stated that *Redman* discloses a turbine vane having all of the claimed elements. The Examiner also argued that the phrases "adapted to be coupled to a shroud assembly" and "adapted to be coupled to a manifold assembly" are recitations of intended use.

Claim 1 is directed to a turbine vane comprising "a generally elongated hollow airfoil . . . a serpentine cooling path formed from at least a first inflow section and a first outflow section . . . at least one leading edge cooling path positioned proximate to the leading edge . . . a generally elongated hollow airfoil . . . [and] at least one metering rib defining a barrier between a portion of the first inflow section and the at least one leading edge cooling path,

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wherein the at least one metering rib includes at least one metering orifice creating a fluid pathway between the first inflow section and the at least one leading edge cooling path" (emphasis added). In stark contrast, *Redman* does not disclose a metering rib defining a barrier between a serpentine channel and a leading edge cooling path in which the metering rib includes at least one metering orifice creating a fluid pathway between the first inflow section and the at least one leading edge cooling path. The Examiner cites element 39 of *Redman* as being a metering rib forming a barrier. However, element 39 is described as an air entry tube at column 3, line 44 in *Redman*. Element 38 of *Redman* appears to form a barrier separating a serpentine cooling channel from another cooling channel; yet, element 38 is defined in *Redman* as being a diaphragm dividing leading and trailing sections at column 3, lines 32 and 33. Nonetheless, *Redman* does not disclose metering holes in the diaphragm 38 creating a fluid pathway between the first inflow section and the at least one leading edge cooling path. Thus, for at least this reason, claim 1 is not anticipated by *Redman*, and the Examiner is respectfully requested to withdraw the rejection of claims 1, 6-7, and 9-10.

V. REJECTION OF CLAIMS 5, 12, 16-20 UNDER 35 U.S.C. §103(a)

The Examiner rejected claims 5, 12, 16-18, and 20 under 35 U.S.C. §103(a) as being unpatentable over United States Published Application No. 2004/0022630 to *Tiemann* in view of United States Patent No. 5,120,192 to *Ohtomo*. The Examiner stated that *Tiemann* discloses the claimed invention. However, the Examiner admitted that *Tiemann* does not

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disclose that the leading edge cooling path is a divergent cooling path. The Examiner stated that *Ohtomo* discloses a divergent cooling path in figures 11 and 12.

Amended claims 1 and 12 are directed, in relevant part, to a turbine vane comprising "a generally elongated hollow airfoil having . . . a first end adapted to be coupled to a shroud assembly . . . a serpentine cooling path formed from at least a first inflow section and a first outflow section . . . [and] wherein the first inflow section of the serpentine cooling path forms a generally linear cooling fluid pathway between the at least one inlet orifice and the first turn of the serpentine cooling path" (emphasis added). In contrast, the cooling channel disclosed in *Tiemann* does not disclose a generally linear cooling fluid pathway extending between an inlet orifice and the first turn of the serpentine cooling path. Furthermore, claims 1 and 12 recite, in relevant part, "a serpentine cooling path formed from at least a first inflow section and a first outflow section, the first outflow section in communication with the first inflow section and extending from a first turn formed from a continuous wall generally toward the first end of the generally elongated hollow airfoil. In contrast, neither *Ohtomo* nor *Tiemann* does not disclose a first turn formed from a continuous wall. Rather, *Tiemann* discloses a cooling passage identified as cooling passage 55 in Figure 1 that is positioned in the serpentine channel at the first turn, and *Ohtomo* does not disclose a serpentine cooling channel and does not disclose a first inflow section in communication with a first outflow section, wherein the first outflow section extends from a first turn formed from a continuous wall generally toward the first end of the generally elongated hollow airfoil. Thus, for at

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least these reasons, claims 1 and 12 are not rendered obvious by the combination of *Tiemann* and *Ohtomo*, and the Examiner is respectfully requested to withdraw his rejection of claims 5, 12, 16-18, and 20.

The Examiner rejected claim 19 under 35 U.S.C. §103(a) as being unpatentable over United States Published Application No. 2004/0022630 to *Tiemann* in view of United States Patent No. 5,120,192 to *Ohtomo*, further in view of *Redman*. Claim 19 depends indirectly from claim 12, which is allowable for the reasons set forth herein. Therefore, claim 19 is allowable as well, and the Examiner is respectfully requested to withdraw the rejection.

VI. PETITION FOR TWO MONTH EXTENSION OF TIME

This is a Petition for a Two Month Extension of Time pursuant to 37 CFR § 1.136. Please charge the fee in the amount of \$225.00 for a two (2) month extension of time pursuant to 37 CFR § 1.17(a)(2) and charge any underpayment or credit any overpayment to Deposit Account No. 50-0951. A duplicate copy of this communication is enclosed.

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CONCLUSION

For at least the reasons given above, claims 1-20 define patentable subject matter and are thus allowable. The undersigned representative thanks the Examiner for examining this application.

Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is respectfully requested to contact the undersigned representative at the telephone number listed below.

No fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 50-0951.

Respectfully submitted,



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